

CLAIMS

What is claimed is:

1    1. A method of reducing flooding from a network device,  
2 comprising:

3                 maintaining an unknown address and a count at a first port  
4 of the network device, the unknown address being a network address  
5 for which there is no information at the first port identifying  
6 another port of the network device to which unicast frames  
7 containing the unknown address are to be forwarded, the count  
8 identifying the number of times frames containing the unknown  
9 address have been flooded from the first port to other ports of  
10 the network device;

11                upon receiving unicast frames containing the unknown address  
12 at the first port while the count is less than a predetermined  
13 threshold, incrementing the count and flooding the received frames  
14 to the other ports of the network device;

15                when the count has reached the predetermined threshold,  
16 determining whether there is information at a second one of the  
17 other ports of the network device identifying a specific one of  
18 the ports of the network device to which unicast frames containing  
19 the unknown address are to be forwarded, and if so then  
20 transferring the information from the second port to the first  
21 port, whereupon the unknown address becomes known at the first  
22 port; and

23                upon receiving unicast frames containing the now known  
24 address at the first port, forwarding the received frames to only  
25 the specific port identified in the information transferred from  
26 such other port to the first port.

1    2. A method according to claim 1, wherein maintaining the unknown  
2 address and the count at the first port comprises:

3       determining, upon flooding a unicast frame containing the  
4   unknown address, whether a bin has been established for the  
5   unknown address and the count; and

6       if the bin has not been established, then establishing the  
7   bin and initializing the count to one.

1   3. A method according to claim 2, wherein establishing the bin  
2   comprises determining whether a predetermined maximum number of  
3   bins have already been established, and establishing the bin only  
4   if the predetermined maximum number of bins have not already been  
5   established.

1   4. A method according to claim 1, further comprising:

2       maintaining a forwarding table at the first port, the  
3   forwarding table containing entries associating known addresses  
4   with corresponding ports;

5       upon receiving the unicast frame, searching the forwarding  
6   table using the address contained in the frame to determine  
7   whether the address is known at the port; and

8       upon the transfer of the information from the second port,  
9   adding a corresponding entry to the forwarding table.

1   5. A method according to claim 4, further comprising participating  
2   in a periodic re-synchronization of the forwarding table with a  
3   forwarding table of the second port.

1   6. A method according to claim 1, further comprising monitoring  
2   how long the address and count are maintained, and upon  
3   maintaining the address and count for a predetermined maximum time  
4   before the count has reached the predetermined threshold, then  
5   discarding the address and count.

1       7. A method according to claim 1, wherein the first and second  
2       ports are included in an aggregated port appearing as a single  
3       logical port for frame forwarding purposes.

1       8. A network device, comprising:

2              a plurality of line cards, each line card including a  
3       respective port, two of the ports being configurable as an  
4       aggregated port forming a single logical connection to another  
5       device;

6              the port of a first one of the line cards being a first port  
7       operative to:

8                  (i) maintain an unknown address and a count, the  
9       unknown address being a network address for which there is  
10      no information at the first port identifying another port of  
11     the network device to which unicast frames containing the  
12     unknown address are to be forwarded, the count identifying  
13     the number of times frames containing the unknown address  
14     have been flooded from the first port to other ports of the  
15     network device;

16                  (ii) upon receiving unicast frames containing the  
17     unknown address from the other device while the count is  
18     less than a predetermined threshold, increment the count and  
19     flood the received frames to the ports of the other line  
20     cards;

21                  (iii) when the count has reached the predetermined  
22     threshold, determine whether there is information at the  
23     port of a second one of the line cards identifying a  
24     specific one of the ports of the network device to which  
25     unicast frames containing the unknown address are to be  
26     forwarded, and if so then obtain the information from the  
27     port of the second line card, whereupon the unknown address  
28     becomes known at the first port; and

(iv) upon receiving unicast frames containing the now known address from the other device, forward the received frames to only the specific port identified in the information transferred from the port of the second line card to the first port; and

the port of the second line card being a second port operative to:

(i) receive unicast frames from ports of the other line cards and transmit the received frames to the other device;

(ii) upon receiving unicast frames from ports of the other line cards, learn respective associations between addresses in the received frames and the ports from which the frames are received; and

(iii) provide the information concerning the unknown address to the first port from the learned associations.

9. A network device according to claim 8, wherein the first port is further operative when maintaining the unknown address and the count to:

determine, upon flooding a unicast frame containing the unknown address, whether a bin has been established for the unknown address and the count; and

if the bin has not been established, then establish the bin and initialize the count to one.

1 10. A network device according to claim 9, wherein the first port  
2 is further operative when establishing the bin to determine  
3 whether a predetermined maximum number of bins have already been  
4 established, and establish the bin only if the predetermined  
5 maximum number of bins have not already been established.

1 11. A network device according to claim 8, wherein the first port  
2 is further operative to:

3        maintain a forwarding table at the first port, the  
4        forwarding table containing entries associating known addresses  
5        with corresponding ports;

6        upon receiving the unicast frame, search the forwarding  
7        table using the address contained in the frame to determine  
8        whether the address is known at the port; and

9        upon the transfer of the information from the second port,  
10      add a corresponding entry to the forwarding table.

1        12. A network device according to claim 11, wherein the first port  
2        is further operative to participate in a periodic  
3        re-synchronization of the forwarding table with a forwarding table  
4        of the second port.

1        13. A network device according to claim 8, wherein the first port  
2        is further operative to monitor how long the address and count are  
3        maintained, and upon maintaining the address and count for a  
4        predetermined maximum time before the count has reached the  
5        predetermined threshold, then discard the address and count.

1        14. A network, comprising:

2            a plurality of stations;

3            a bridge coupled to a first subset of the stations; and

4            a network device coupled to the bridge and to a second  
5        subset of the stations via corresponding physical ports of the  
6        network device, the coupling between the network element and  
7        bridge being in the form of an aggregated port including at least  
8        first and second physical ports, the network device being  
9        operative to:

10            (i) maintain an unknown address and a count at the  
11        first port of the network device, the unknown address being  
12        a network address for which there is no information at the  
13        first port identifying another port of the network device to

14       which unicast frames containing the unknown address are to  
15       be forwarded, the count identifying the number of times  
16       frames containing the unknown address have been flooded from  
17       the first port to other ports of the network device;

18                 (ii) upon receiving unicast frames containing the  
19       unknown address at the first port while the count is less  
20       than a predetermined threshold, increment the count and  
21       flood the received frames to the other ports of the network  
22       device;

23                 (iii) when the count has reached the predetermined  
24       threshold, determine whether there is information at the  
25       second port of the network device identifying a specific one  
26       of the ports of the network device to which unicast frames  
27       containing the unknown address are to be forwarded, and if  
28       so then transfer the information from the second port to the  
29       first port, whereupon the unknown address becomes known at  
30       the first port; and

31                 (iv) upon receiving unicast frames containing the now  
32       known address at the first port, forward the received frames  
33       to only the specific port identified in the information  
34       transferred from such other port to the first port.